

Spring Movement Patterns of Two Radio-tagged Male Spotted Turtles

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ABSTRACT.— Spring movements of male spotted turtles (*Clemmys guttata*) on the upper Coastal Plain of South Carolina may be extensive. Movement in 24 hours for two turtles equipped with small radio transmitters ranged from 0 to 423 m. The typical activity pattern involved a series of movements throughout each pond that was occupied, followed by overland travel to the next nearest body of water. Back-tracking to previously occupied habitats was observed only once. These movements may reflect mate-search activity and support the concept of "transient behavior."

Males turtles of many species appear to move greater distances than females at certain times of the year (Chelazzi and Francisci 1979, Morreale et al. 1984, Parker 1984, Berry 1986, Gibbons 1986). This difference is thought to be representative of divergent reproductive strategies between the sexes, but other explanations for movement are possible, including seasonal migrations to and from overwintering sites and departure from an unsuitable habitat (Gibbons 1986). In general, the reproductive strategy hypothesis predicts that male reproductive success is dependent on the number of mating opportunities available (Trivers 1972, Williams 1975, Maynard Smith 1978). Under this assumption, a male turtle's reproductive success could benefit by increasing movements in search of females during the breeding season (Morreale et al. 1984). Occasionally, movements are extensive and some males may act as "transients," moving regularly throughout the active season without recrossing areas previously traversed (Kiestler et al. 1982, Parker 1984). Observations of the spotted turtle, *Clemmys guttata* (Schneider), made during a study of its seasonal activity patterns in South Carolina (Lovich 1988), support the concept of extensive movements by males during the breeding season. The purpose of this note is to report those observations.

The study site was located along Risher Road on the Savannah River Plant in Barnwell Co., S.C. This area is characterized by scattered, shallow, ephemeral marshes, and cypress-tupelo ponds separated by pine plantations and clearcuts. Two adult male *C. guttata*, designated ACJ and ACI, were collected on 2 March 1987 and equipped with small

radio transmitters. The plastron lengths of the turtles were 93 mm and 99 mm, respectively. A transmitter was attached to the posterior portion of each carapace and accounted for 10% or less of the animal's mass. The turtles were released at the respective points of capture on 6 March and located daily until 15 April. From 15 to 23 April, positions were determined every 48 hours. Both turtles were periodically brought back to the laboratory during the study period for battery replacement or transmitter-package repair. In spite of the downtime, 35 observations of movement were obtained for each turtle. Every attempt was made to minimize disturbance to the turtles during tracking. After each turtle was located, the straight-line distance to the previous point of capture was measured with a meter tape or determined from aerial photographs.

A summary of major movement patterns is shown in Fig. 1. Movements in 24 hours ranged from 0 to 423 m. Twenty-two percent of all daily changes in location were greater than 100 m. Rates of movement reached 20.7 m/hour with a mean of 2.7 m/hour. The distances moved between captures did not differ significantly between the two turtles (Mann-Whitney $U = 617$; $df = 1$; $P = 0.80$). ACJ moved a total of 2,750 m and ACI 1,843 m. The greatest straight-line distance achieved from original point of capture was more than 1,000 m for each turtle. During these movements, each animal occupied three separate aquatic habitats (marshes and ponds) (Fig. 1). Known time spent in each habitat ranged from 4 to 20 days. The typical activity pattern involved a series of movements through an aquatic habitat followed by overland movements (up to 2 days) to the next nearest body of water. Return by an individual to a previously occupied aquatic habitat was observed only once.

Detailed descriptions of short-term movements have not previously been reported for this species. However, Ernst (1968) found that a small proportion of *C. guttata* in a Pennsylvania population returned to the original point of capture 4 to 64 days after being moved 805 m upstream from his study site. Netting (1936) reported movement of *C. guttata* from an upland hibernation site to a small swamp, but provided no further data. Ernst (1976) found that normal daily movements (based on hand recaptures) were rarely more than 20 m, but males were occasionally captured up to 250 m from water during the mating season. Seasonal microhabitat selection was reported by Ward et al. (1976), but daily movement data were not provided. The results of the present study, although provisional, suggest transient behavior (as defined by Kiester et al. 1982, Parker 1984) as well as oriented long-distance movement in male *C. guttata*. Because these movements occurred during the mating season (Ernst 1976), they may be a reflection of mate-search activity, as suggested by Morreale et al. (1984). It is not likely that these short-term

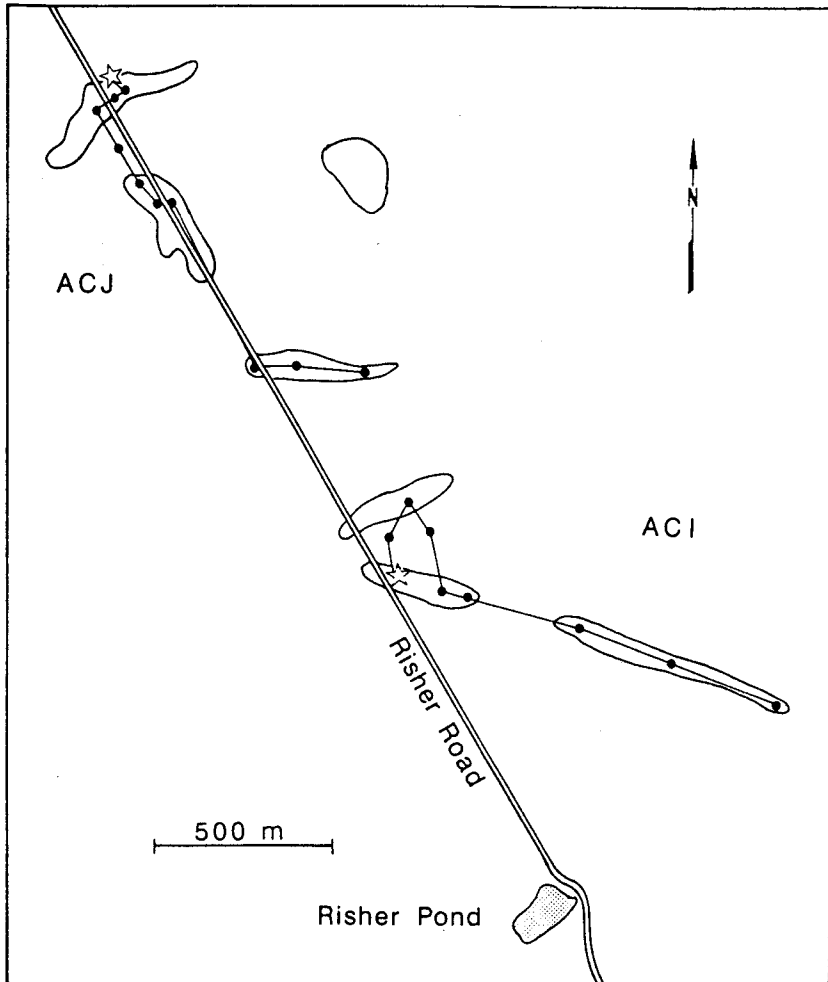


Fig. 1. Map of study area showing major aquatic habitats (temporary marshes and ponds) along Risher Road. Paths represent major movement patterns and do not include every capture point. Starting points are designated with a star.

movements were in response to major changes in the aquatic habitats since water levels remained relatively stable during the period of study. Additionally, no correlations between environmental temperatures and turtle movements were detected.

Comparative data are not available for females, but I predict that they will show greater site fidelity than males. Ernst (1970) reported similar home-range size in male and female *C. guttata*, but his results

may be an artifact of long-term hand recapture techniques. Kiester et al. (1982) considered radiotelemetry to be a basic prerequisite for determining transient behavior in turtle populations.

The possible importance of transient males in maintaining gene flow between adjacent turtle populations was suggested by Kiester et al. (1982). In fact, genetic exchange among populations of freshwater turtles in adjacent aquatic habitats has been demonstrated electrophoretically (Scribner et al. 1984). The phenotypic homogeneity exhibited by the widely distributed spotted turtle (Ernst and Barbour 1972) may be a result of this behavior.

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